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Firms warm up to the 'ice that burns'

BY MONICA PERIN
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A trio of Houston-based oil and gas companies subsidized by federal funding are taking part in a global search for a potentially vast new source of energy.

Anadarko Corp., Noble Drilling Corp. and Mauer Technology Inc. will begin drilling on the North Slope of Alaska next month in an unprecedented attempt to recover a core sample of methane hydrate, also known as the "ice that burns."

For now, methane hydrate is the stuff of science fiction, but it could also be the fuel of the future.

Methane hydrate is a chunk of ice with methane — also known as natural gas — trapped inside. Methane hydrates look like dirty chunks of ice, but if touched by a flame the ice burns.

The energy potential of methane hydrates could be staggering. The Department of Energy estimates methane hydrates in and around the U.S. to be as much as 200,000 trillion cubic feet, dwarfing the country's estimated 1,400 trillion cubic feet of conventional natural gas resources and reserves.

Although the potential is there, the industry is still unsure about how to harness the energy once hydrates are found.

In fact, until 1981, no scientists had ever seen a methane hydrate sample brought up intact from the ocean floor. That year, the drilling vessel Glomar Challenger, on an expedition for the National Science Foundation off the coast of Guatemala, unexpectedly bored into a methane hydrate deposit, and scientists on board were able to recover a sample.

Now that scientists have had a chance to study methane hydrates, it is estimated that if just 1 percent of these hydrates could be made technically and economically recoverable, the U.S. could more than double its domestic natural gas resource base.

An added bonus is that methane is the highest quality, cleanest-burning natural gas, making it an environmentally friendly fuel.

Plus, the frozen water that contains the methane is pure and could be a valuable by-

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MICHAEL STRAVATO/HBJ

Randy Couch of Anadarko: 'No one has ever produced hydrates. It's an unknown.'

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METHANE: Scientists, drillers set out to explore potential new energy source

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product as water itself becomes a scarcer resource.

"Everyone is very excited about it," says Randy Couch, manager of E&P technology and planning for Anadarko. "No one has ever produced hydrates. It's an unknown."

DRILL BIT

The U.S. Department of Energy is helping to fund the $9.2 million research project that is being undertaken by Anadarko, Noble and Mauer, which are tasked with determining whether methane hydrates in the permafrost of Alaska's North Slope could be commercially produced.

This is one of two dozen research projects DOE is funding to learn more about methane hydrates. Two other efforts also involve Houston companies.

Houston-based ConocoPhillips is joining forces with Chevron Petroleum Technology Co. to drill three wells in the Gulf of Mexico next year to search for methane hydrates. And Houston's Westport Technology Center International is working on a program that involves developing new methodologies, services and software for conventional drilling in the presence of hydrates and for production of hydrates (see chart below).

But the project involving Anadarko, Noble and Mauer is first in line for launch.

In just a few weeks, the companies will begin drilling on Anadarko leases on Alaska's North Slope to bring up core samples of methane hydrate. It will be the first time ever that this has been attempted.

The well won't take long to drill, but the tricky part will be figuring out how to handle the hydrates, says Couch.

"The biggest difference from the traditional oil and gas reservoirs we encounter is that they are fluid — the oil or natural gas flows. Methane hydrate is in a frozen state, and when it is taken out of its range it dissolves into natural gas and water. The issue is: when does that dissolution take place? There are significant engineering challenges involved."

Anadarko and its partners plan to bring the methane hydrate reservoir up in a solid core and transfer it immediately to the world's first mobile Arctic core laboratory, which Anadarko designed and constructed.

"We will be able to do evaluation onsite in real-time so nothing melts. You have to preserve these cores," Couch says.

The companies expect to have some testing completed by April or May, which should yield an initial description of the core. They will then start working on production tests, a project which will involve the University of Alaska.

"It will be a long-term process to understand the physics of how methane hydrates will flow and produce, what type of equipment might be designed for it and how economical it will be," Couch says. "Technology is going to be the key."

The three-year project, which is now in its second year, is expected to cost $9.7 million, with DOE kicking in about half and the industry partners picking up the other half. The acreage and the seismic data being used is Anadarko's. The methane hydrate reservoir was discovered by Anadarko in the course of its conventional drilling operations in the area.

Brad Tomer, an official of the National Energy Technology Laboratory, one of the government agencies involved in methane hydrate research, says he believes this project and others will show that commercial production of methane hydrates can become a reality in the next 10 years.

GULF GAME

The Gulf of Mexico off the Texas and Louisiana coasts is another hotspot for methane hydrate research. Last summer, at least two research expeditions studied methane hydrates on the floor of the Gulf.

A team of scientists from the Gulf of Mexico Hydrates Research Consortium at the University of Mississippi examined the northern Gulf, collecting samples of gas hydrates from a newly discovered mound in the deeper water of the Mississippi Canyon.

The project is supported by the U.S. Minerals Management Service, the National Oceanic and Atmospheric Administration and the DOE's National Energy Technology Laboratory.

Another research team composed of scientists from nine nations studied the Gulf of Mexico to determine whether gas hydrates exist away from obvious seafloor mounds in adjacent sedimentary basins. The scientists collected 17 cores, some as long as 125 feet.

And last fall, an internationally funded research expedition off the Oregon coast brought back the largest amount of marine methane hydrate core samples ever recovered.

Contained in pressure vessels six feet long and four inches in diameter, the samples were shipped to Texas A&M University for study by scientists. ■

'ICE THAT BURNS'

Methane hydrates form where low temperatures and high pressure exist — basically in two geological environments:

- About 1,500 to 2,500 feet underground in permafrost regions such as Alaska, the Arctic and Siberia.
- On and beneath the ocean floor at water depths greater than 500 meters, including the continental shelf along the East and West coasts of the U.S. and the Gulf of Mexico.

HOUSTON COMPANIES HARNESSING HYDRATES

COMPANIES INVOLVED: Anadarko Corp., Noble Drilling Corp., Maurer Technology Inc.
LOCATION: Alaska North Slope
EXPECTED DRILLING: February 2003
TOTAL EST. COST: $9.7 million
DOE GRANT: $4.2 million

COMPANIES INVOLVED: Chevron Petroleum Technology Co., ConocoPhillips
LOCATION: Deepwater Gulf of Mexico
EXPECTED DRILLING: Three wells in 2004
TOTAL ESTIMATED COST: $13.6 million
DOE GRANT: $1.5 million

COMPANY INVOLVED: Westport Technology Center International
LOCATION: Gulf of Mexico
PROJECT: Develop new methodologies, services and software for conventional drilling in the presence of hydrates and for production of hydrates.
PROJECT DATES: 2002-2005
TOTAL ESTIMATED COST: $1 million
DOE GRANT: $204,000

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